DOCUMENT RESUME

ED 072 846 PS 006 212

AUTHOR Stephens, Mark W.
TITLE Locus of Control as Mediator of Cognitive Development.
SPONS AGENCY National Center for Educational Research and Development (DHEW/OE), Washington, D.C.; National Inst. of Mental Health (DHEW), Bethesda, Md.; Purdue Research Foundation, Lafayette, Ind.
PUB DATE 6 Sep 72
CONTRACT OEC-0-70-4952(286)
GRANT OEG-5-70-0039(509)
NOTE 15p.; Paper presented at the Annual Convention of the American Psychological Association (80th, Honolulu, Hawaii, September 6, 1972)

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Academic Achievement; *Cognitive Development; Correlation; *Intellectual Development; *Intelligence Differences; *Locus of Control; Parent Child Relationship; Positive Reinforcement; Preschool Learning; Psychological Studies; Research Needs; Speeches; Technical Reports
IDENTIFIERS Caldwell Preschool Inventory; Childrens Embedded Figures Test; ITPA Visual Encoding; Peabody Picture Vocabulary Test; Raven Progressive Matrices; WPPSI Picture Completion

ABSTRACT

Current research indicates the possible influence of IE development on cognitive development. Efforts are being made to identify behaviors by which parents or teachers can increase development of internal control expectancies in preschool children. Studies correlating children's IE scores with various mother behaviors or mother-child interaction patterns are being conducted. The theoretical rationale is that if development of internal control expectancies increases information seeking, information processing, and information using in early childhood, it should then contribute to intellectual development. Correlations of IE to cognitive development in early childhood that have been found include: (1) clear developmental trends in internal control scores; (2) clear socioeconomic differences; (3) expected cultural differences; and (4) mixed evidence about relation to intelligence and achievement test scores. Research this year has been focused on relating IE to several specific cognitive development variables under laboratory conditions. Findings showed: (1) fairly good evidence of relation to ability-type laboratory tasks (discrimination and mirror tracing learning tasks) and cognitive style and strategy variables; (2) the intelligence-type tests used seem not valid enough to test any relation of IE to intelligence; and (3) persistence and alertness--attentiveness seem not generalized enough dispositions to relate to any variable, IE or other. Incidental findings concerning performances and intercorrelations may be significant for future research. (KM)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

ED 072846

PS 006212

LOCUS OF CONTROL AS MEDIATOR OF COGNITIVE DEVELOPMENT[1]

Mark W. Stephens

Purdue University

Many studies have reported a relationship between IE and academic achievement (i.e., McGhee & Crandall, 1968; Crandall, Katkovsky, & [illegible] 1962; Chance, 1968). What we are interested in is something beyond this: that IE development might also mediate development of intelligence. This, I concede, is a long-shot; but there is both theoretical and empirical reason to hope that it may be true, and, if it is, it may open up some terribly exciting possibilities for manipulating intellectual development - as, for example, through compensatory preschool educational experiences.

So far we have evidence at least encouraging enough to keep on looking. We hope to spend the next two years trying to identify particular behaviors we can teach parents or teachers by which to increase development of internal control expectancies in preschool children. This we are doing - now - strictly by correlational studies, correlating children's IE scores with various mother behaviors or mother-child interaction patterns. If our evidence is strong enough in two years - both the relation of these mother behaviors to IE development and the relation of IE to cognitive development - we hope then to try a true experimental personality development study with humans: we want to try to teach a group of mothers these internality-enhancing behaviors and see whether we can thus increase development of internality; and we want also to see whether this has brought

---

[1]Paper presented at Symposium on Recent Research into Cognitive Correlates of Locus of Control, American Psychological Association convention, Honolulu, September 6, 1972. This research was supported by NIMH Grant No. MH 21423-02, by U.S.O.E. Grant No. OEG-5-70-0039(509), by U.S.O.E. Contract No. OEC-0-70-4952 (286), by Purdue Research Foundation Grant No. 6258-56, and by NIMH Fellowship No. 1 FO 1 MH 48361-01 (MTLH).

FILMED FROM BEST AVAILABLE COPY

a parallel increase in cognitive development.

Let me first develop the theoretical rationale. There are several studies with adults and older children that indicate that IE is related to a number of cognitive styles and dispositions which should often aid learning and performing. The other papers on this symposium (Steffy, 1972; Strickland, 1972; Lefcourt, 1972; Ryckman, 1972) touch on many of these. Other studies have found, for example, that IE is related to attention-deployment in an experimentally controlled situation (Lefcourt & Wine, 1969), to the tendency to seek information and/or use information in a problem-solving situation (Davis & Phares, 1967; Phares, 1969), and to persistence on difficult intellectual tasks (Crandall, 1970). Each of these correlates ought indeed to enhance performance - on all kinds of laboratory tasks, and also on academic achievement measures. However, each may do more than this: it may increase the rate at which the child assimilates information, actively processes information, and attempts varying problem-solving strategies (in discrimination learning or probability learning, for example, or even in motor learning or rote learning tasks). If development of internal control expectancies increases information seeking, information processing, and information using in early childhood, it ought then to increase the rate of development of schemata - both simple, information-type schemata (of the sort often assessed on intelligence tests and school tests) and also more complex, integrative schemata. Also, if internal control expectancy development increases attempts at varying problem-solving strategies, it ought to increase the rate of development of more effective problem-solving strategies: and this in turn should contribute to development of more complex schemata.

In short, these IE correlates should contribute to intellectual development, whether we define intelligence in Piaget terms, or in Kagan-type terms (as denoting cognitive processes, rather than cognitive "contents"), or in traditional intelligence-test terms.

The underlying assumption, of course, is that "intelligence" consists of a set of cognitive operations which can be viewed as similar in some crucial ways, to overt instrumental behaviors. They can be defined as classes of covert responses which can be subjected, at least indirectly, to reinforcement. Certainly, attention-deployment, reflectivity, and information seeking are subject to reinforcement. Whether more totally covert mediating processes can be is perhaps arguable. Even if only these relatively peripheral processes are subject to reinforcement, though, they have obvious influence on the rate of complex stimulus input, or the raw material for cognitive operations, which presumably forms the basis for further development of cognitive operations; so the influence of reinforcement can still be felt. This influence ought to be increased to the extent that the child is attuned to the reinforcing consequences of his behavior. Viewing cognitive development as even partially under the control of reinforcement allows us to seek ways to increase cognitive development through reinforcement. Whether or not we can ever isolate and reinforce these cognitive operations directly, we may able to increase intellectual development through reinforcement at least indirectly through enhancing IE development; and this may allow us to go beyond the limits of present means of enhancing intellectual development simply through providing optimal stimulation.

Let me turn now to the evidence we have concerning the relation of IE to cognitive development in early childhood. Note that none of these

studies implicates IE as mediator or antecedent of cognitive development only as a correlate. To establish IE as antecedent or mediator we need to manipulate IE development (through teaching mothers, for example) and observe later cognitive development. This we have not yet done, and I do not believe we ethically can do it until we first have better non-manipulative evidence of a relationship of IE to cognitive development. Such evidence is what the following studies were designed to get. All the studies I will cite are with nursery school children, and used our SDRCI interview IE measure, except as I note to the contrary.

First, to start at the simplest level, we have found clear developmental trends, as expected, in internal control scores (Stephens, 1971, 1972). Means for four-year-olds range from 8 or 10 (out of a possible 40), among disadvantaged children, to around 16, in upper middle class children (Delys, 1971). For second graders they range from 18 or 19, in a traditional ghetto school, to 23, in a middle class school (Stephens, 1971a, 1972c). For third graders, the one group we tested - a middle class group - had a mean of 26 (Stephens, 1972b). There is great overlap between groups: standard deviations are often 6 or 7. Still, the age trend is marked, as expected.

Second, the socioeconomic differences are also clear. Both white and black Head Start groups scored lower than middle class children in one study (Delys, 1971), with no difference between black and white subjects. In another study, (Stephens, 1971a, 1972c) middle class second graders scored higher than any of four Project Follow Through disadvantaged groups or than a "ghetto" non-Follow Through group. In another study, children in a non-Head Start compensatory preschool program were categorized by OEO criteria as to whether they were above or below the family income level that defined eligibility for "poverty" programs (Stephens, Delys,

& Parker, 1971); those above that level had significantly (p = .08) higher scores than those below it, even though all came from the same neighborhood and differences in affluence were not visible to the naked eye.

Third, cultural differences (Stephens, 1971b, 1972b), are roughly as one would expect. White and black disadvantaged groups are not significantly different. American Indian Head Start groups, however, score about as high as middle class children - except for one such group we tested (Stephens & Poindexter, 1971), which was significantly lower than all others (p < .05). We were told at most reservations where we tested that school achievement problems do not seem to show up before at least second or third grade, so the relatively high internal control scores are apparently in accord with concurrent achievement trends, even if previously we had not expected this. Chinese-American preschoolers had higher scores than any other group we've tested (Wang, 1972; Wang & Stephens, 1971, 1972). Chicano and Puerto Rican children tested in this country did not have notably high or low scores (Stephens, Delys, Lopez-Roig, & Vilez, 1971), but these data are hard to interpret because of experimenter differences, because of the fact that these children were neither disadvantaged nor truly middle class, and because these were often all children whose parents had <u>immigrated</u> and thus were not typical representatives of their prior culture.

Next, let me report the mixed evidence we have about relation to intelligence test scores and achievement test scores. Poindexter (1972) found a significant (r = .42, p < .01) correlation with Slosson Intelligence Test MA scores. This was the "best" intelligence test we've used in such studies and the cleanest data. In another study (Stephens & Waite, 1972) we had scores at both beginning and end of year on both the IE test and also the Caldwell Pre-School Inventory (PSI) and the Beery Visuo-Motor

PS 006212

Inventory (VMI). IE was not related to either of these, nor did it predict increase, from beginning to end of year, in scores on either; however, for girls Visuo-Motor Inventory scores at the beginning of the year predicted increase in IE scores from beginning to end of year, and for boys initial Pre-School Inventory scores did the same. This in itself suggests that intelligence may mediate IE development, but not the reverse. I suspect intelligence does in fact mediate IE development; but I also suspect IE may mediate intellectual development too - that there is a reciprocal relation between the two - that we just did not have enough power in this study to show, since we were testing young disadvantaged children who are very difficult to test and whose scores, therefore, are of marginal reliability. Retest reliability in this group was only .26 for the IE test, for the Caldwell .60 and .43 for the Beery. In our studies with middle class nursery schoolers, we gave the IE test and the Peabody Picture Vocabulary Test (PPVT), Raven's Progressive Matrices (RPM), the WPPSI Picture Completion subtest and the ITPA visual encoding subtest. Here IE scores correlated nonsignificantly with these intelligence-type tests or pieces thereof; those tests in turn correlated only in the .20's and .30's with one another, so they did not, apparently, give us a very clear test of the relation of IE to "intelligence". This year we intend to give the WPPSI, and possibly the Binet, to a sample of middle class nursery schoolers, and if possible test both at beginning and at end of year. We ought to have a far clearer picture then of the relation of IE and overall "intelligence", and the relation of each to subsequent development of the other.

Correlations with achievement test scores are also complicated. Again we get sex differences. In a group of middle class third graders, both our test and the Gruen-Korte-Stephens test predicted Stanford Achievement Test scores not at all for girls, nor did they predict their teacher ratings of various achievement-oriented behavior; but for boys the did predict those classroom behaviors and, at least marginally ($r = .26$), achievement test scores. We found the reverse sex difference with the Crandall IAR test and the Nowicki-Strickland test: those tests predicted achievement and classroom behavior for girls but not for boys. There were similar sex differences in intercorrelations among IE tests, too. In another study (Stephens, 1971a, 1972c), with 575 second grade Follow Through children there was no correlation of the SDRCI with Wide Range Achievement Test scores for girls but a marginal correlation for boys, and the reverse sex difference with the Nowicki-Strickland test; the Gruen-Korte-Stephens test did predict achievement scores significantly for both sexes. This study used EDC-model "open classroom" programs and Engelmann-Becker model "behavior modification" programs, in both of which the IE-achievement relation may well have been obscured; so it may not yield the best evidence of the relation of IE to achievement in "normal" classes.

Let me spend the rest of the time reporting what we've found this year in trying to relate IE to several specific cognitive development variables, under laboratory conditions. There were several purposes of these studies:

(1) The main one was to provide an interim test of our theory regarding how IE development may mediate intellectual development. Specifically, we are trying to see to what extent, in preschool age children,

IE development is related to variables like attention-deployment, reflectivity, and persistence on intellectual tasks which might in turn mediate acquisition of schemata, refined problem-solving skills and strategies, etc. and thereby mediate intellectual development.

(2) Beyond this we designed these studies to be, as much as possible, quasi-"replications" of studies with older children and adults which used other measures. It is more apt, of course, to call these tests of the generalizability to other ages and measures of previous findings. However, few if any of these studies had been replicated; and, in trying to replicate our own studies, we have found that it is indeed dangerous to try to replicate anything that looks neat. Most often we've found the phenomena a lot more complicated than we thought they would be and "replications" fairly unpredictable.

(3) Also, we view these as reflecting on the construct validity of our IE measure. Our measure is, I think, plenty face valid, and has the proper correlates, generally, with age, educational experience, economic status, and such. For what it's worth, I think our test is "valid" - although it is not as powerful as we would like, and I am sure it picks up a lot of error too. But we still need more evidence of validity, and this kind of construct validity evidence is the most important, I think. As I have reported elsewhere (Stephens, 1971a, 1972a,b) we've found that the various children's IE tests generally do not intercorrelate with one another, at least among young children, and really seem to be measuring different variables; so convergent validation is, apparently, inapproriate.

(4) Finally, we view these studies as simply showing us a little more what an "internal" child and an "external" child are like. We have, in fact, changed some ideas. Many of these studies were done and replicated with the same two groups of children, one consisting of 33 children in two parent cooperative nursery school groups and the other 36 children in two university laboratory nursery school classes. We have tested and observed these children enough to have almost a clinical picture of them; and this has helped understand a lot of the numbers we have. We intend to carry this clinical-intensity strategy even further next year. As long as we replicate, and test our "insights" under control, I do not believe we have anything to lose by this clinical strategy, and I think we've gained a lot.

The cognitive development correlates of IE we've tried to tie down could be more or less grouped into four categories, although some tasks could fit into more than one. First would be the "intelligence"-type tests I talked about earlier: the Peabody Picture Vocabulary Test, the Raven Progressive Matrices, the Picture Completion subtest of the WPPSI, and the Visual Encoding subtest of the ITPA. Second would be other cognitive "ability"-type tests: performance on a mirror tracing learning task, performance on a discrimination learning task, and a language development measure. Third would be tasks reflecting cognitive styles or strategies - a Kagan-type cognitive reflectivity-impulsivity task, the Children's Embedded Figures Test, and a probability learning task. Fourth were measures of two particular behavioral dispositions we thought ought to mediate cognitive development: persistence on intellectual tasks and attentiveness or alertness.

To give an overview of the findings: First, IE correlates with the intelligence-type tests were, as I said, low and nonsignificant but in-

conclusive because of the low intercorrelations among these tests themselves. Next year we'll use the WPPSI and maybe also the Binet, and try, finally, to clear up the question of the relation of IE to general "intelligence" among normal, middle class preschoolers.

Second, we did get clear relations with other ability-type tests: we replicated a previous finding (Parker, 1971) of a relation of IE test scores to performance on a mirror tracing learning task, and we got a significant correlation of .41 between IE and performance on a two-choice two-dimension discrimination learning task. (The language development task data are not yet entirely analyzed.)

Third, the results with cognitive style measures were mixed. There was a significant relationship with scores on the Matching Familiar Figures test of reflectivity-impulsivity, generally confirming a finding from a previous study (Waite, 1971). On a probability learning task (McCann, 1972) we also got encouraging data: we found that "external" children tend more than "internal" children or modal IE-score children to follow a win-stay/lose-shift strategy. The embedded figures task, however, did not work out: the correlation with IE scores was opposite to expectation, correlations with other measures were low or weird, and a clear experimenter effect produced major bias in the scores.

Finally, both persistence and attentiveness-alertness appear not to be generalized-enough dispositions to permit a clear test of hypotheses regarding their relation to IE. We tried and failed to replicate Crandall's (1971) finding of a relation of IAR IE test scores to persistence on a Chinese puzzle task; we found persistence on that task was unrelated to teacher ratings of persistence, achievement test scores, or scores on

other IE tests. We tried to relate persistence to IE among preschoolers using our IE test and a different persistence task. All we found that even approached significance was a difference in the IE-persistence correlation for girls, which was positive, and for boys, which was negati- and when we replicated the study we didn't even find that. As far as attentiveness and alertness are concerned we tried to use, adapt, or invent a number of tasks to measure this disposition; but we found these had only low intercorrelations (generally in the .20's and .30's) with on another and with teacher ratings, and no significant correlations with IE.

In summary, we find fairly good evidence of relation to ability-type laboratory tasks (the discrimination and mirror tracing learning tasks) and cognitive style and strategy variables (except for the Embedded Figures Test); our intelligence-type tests seem not to have been valid enough to test any relation of IE to intelligence; and persistence and alertness-attentiveness seem not to be generalized enough dispositions to relate to any variable, IE or other.

Let me close with three separate incidental findings.

First, in many studies we found a trend - sometimes significant - for the best performance to come from children with neither high nor low, but middle-range, IE scores. We now routinely analyze our data both with Pearson r and also trichotomizing subjects as high, low, or medium IE scorers. Almost always the lows - the "Externals" - perform worst, so the traditional analyses often yield "significant" results. Still, I suspect this nonlinearity is not an artifact, and will often occur. I, for one, wish all IE studies would at least be looked at to see when this occurs.

Second is an observation that may explain the first. Many of the children with the highest IE scores had mothers who were quite different from our expectations. At least in our videotaped observations they appeared not succorant, supportive, warm, and such but pushy, achievement-oriented coercive, and anything but warm. At times there seemed to be an overt power struggle between mother and child right on the videotape. A posteriori it makes sense that these mothers might produce very "internal" children. These mothers seemed to be bending every effort to shape their children. The child must indeed have known, then, that how his mother would respond would depend on his behavior. So this would produce high internality - at least, on our measure. But it could produce also passive resistance, perhaps lowered curiosity and spontaneous exploratory behavior, and other non-so-desired attributes, and also lower performance on a number of cognitive tasks.

Third, as I've said, we have found now in two studies - one with 575 second graders, mostly disadvantaged, and the other with 79 middle class third graders - that the various children's IE tests have only low intercorrelations, and that there are sex differences regarding which tests do intercorrelate with one another and with suspected IE correlates. In brief, they seem to be measures of different variables - each of which deserves to be called "locus of control", but importantly different just the same. This, I think, is not bad news: I think it shows us that we can (and should) be more analytic in our conceptualizations ragarding IE than we have been. All this applies to children's IE tests; but cross-cultural data suggest, I believe, there may be similar phenomena in adult IE tests.

References

Chance, June. Mother-child relations and children's achievement. Final Report, NIMH Grant No. MH 05268, University of Missouri, 1968.

Crandall, Virginia, NIMH Progress Report, 1970.

Crandall, V. C., Katkovsky, W., & Preston, A. Motivational and ability determinants of young children's intellectual achievement behaviors. Child Development, 1962, 33, 643-661.

Davis, W. L. & Phares, E. J. Parental antecedents of internal-external control reinforcement. Psychological Reports, 1969, 24, 427-435.

Delys, Pamela. Individual and socioeconomic group differences in locus of control expectancies among preschool populations. Unpublished Master's thesis, Purdue University, 1971 (a).

Delys, Pamela. Rationale, method, and validity of the SDRCI IE measure for preschool children. Paper read at American Psychological Association convention symposium, Developmental Aspects of Locus of Control Expectancies: New Methods and Prospects, Washington, Proceedings, 79th Annual Convention, American Psychological Association, p. 822, 1971 (b).

Delys, Pamela & Stephens, M. W. A structured interview procedure for preschool children: research and clinical uses. Paper presented at joint Indiana-Kentucky Psychological Associations convention, Louisville, 1971 (a).

Delys, Pamela & Stephens, M. W. A locus of control (IE) measure for preschool-age children: model, method, and validity. Paper presented at Midwestern Psychological Association convention, May 6, 1971 (b).

Lefcourt, Herbert M. Cognitive activity as a correlate of locus of control. Paper read at American Psychological Association convention, Honolulu, Hawaii, 1972.

Lefcourt, H. M. & Wine, J. Internal-external control of reinforcement and the deployment of attention in experimental situations. Canadian Journal of Behavioral Science, 1969, 1.

McCann, Damien. The effects of agen and locus of control on probability learning in pre-school children. Unpublished Master's thesis, Purdue University, 1972.

McGhee, P. E. & Crandall, Virginia. Beliefs in internal-external control of reinforcement and academic performance. Child Development, 1968, 39, 91-102.

Parker, Leslie. Locus of control expectancies and the effects of aggression on performance on a learning task. Unpublished Master's thesis, Purdue University, 1971.

Parker, Leslie & Stephens, M. W. Locus of control expectancies of pre-school age disadvantaged children. Paper read at joint Indiana-Kentucky Psychological Associations convention, Louisville, 1971.

Phares, E. J. Differential utilization of information as a function of internal-external control. Journal of Personality, 1969, 36, 649-662.

Ryckman, R. M. Interactive effects of locus of control and sex of subject on confidence ratings and performance in achievement related situations. Paper read at American Psychological Association convention, Honolulu, Hawaii, 1972.

Poindexter, Margaret. The relationship between locus of control and persistence in preschool children. Unpublished Master's thesis, Purdue University, 1972.

Stephens, M. W. Final Report, Evaluation of Locus of Control Measures For Follow Through Evaluation. U. S. Office of Education Contract No. OEC-0-70-4952, Phase III (Amendment), 1971 (a).

Stephens, M. W. Cognitive and cultural determinants of early IE development. Paper read at American Psychological Association convention symposium, Developmental Aspects of Locus of Control Expectancies: New Methods and Prospects, Washington. Proceedings, 79th Annual Convention, American Psychological Association, p. 822, 1971 (b).

Stephens, M. W. Cultural differences in early socialization of internal-external control expectancies. Paper to be read at XXth International Congress of Psychology, Tokyo, August 12-19, 1972 (a).

Stephens, M. W. Annual Progress Report, NIMH grant, Locus of Control and Intellectual Development. 1972 (b).

Stephens, M. W. Dimensions of locus of control: Impact of early educational experiences. Paper to be read at American Psychological convention, Honolulu, September 6, 1972 (c).

Stephens, M. W. & Delys, Pamela. Subcultural determinants of locus of control (IE) development. Paper presented at Midwestern Psychological Association convention, May 6, 1971.

Stephens, M. W., Delys, Pamela, Lopez-Roig, Lucy & Vilez, Carmen. Cultural factors in locus of control dispositions of Mexican-American and Puerto Rican children. Paper read at InterAmerican Congress of Psychology, Panama City, 1971.

Stephens, M. W., Delys, Pamela & Parker, Leslie. Cognitive, economic, and teacher determinants of locus of control expectancies. Unpublished paper, Purdue University, 1971.

Stephens, M. W. & Waite, D. Locus of control and intelligence in disadvantaged preschool children. Unpublished paper, Purdue University, 1971.

Steffy, Richard A. Treatment tailored for internal and external control clients. Paper read at American Psychological Association convention, Honolulu, Hawaii, 1972.

Strickland, Bonnie. Locus of control and competence in children. Paper read at American Psychological Association convention, Honolulu, Hawaii, 1972.

Waite, D. The relationship between locus of control expectancies and cognitive reflectivity-impulsivity. Unpublished Master's thesis, Purdue Univeristy, 1971.

Wang, Dorothy. Chinese-American locus of control expectancies. Unpublished Master's thesis, Purdue University, 1972.

Wang, Dorothy & Stephens, M. W. Cultural factors and philosophical aspects of locus of control expectancies. Paper read at joint Indiana-Kentucky Psychological Association conventions, Lousiville, 1971.

Wang, Dorothy & Stephens, M. W. Internal-external control expectancies of Chinese-Americans. Paper to be read at XXth International Congress of Psychology, Tokyo, August 12-19, 1972.